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EXAMINER	
NGUYEN, TU MINH	

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3748	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/726,745	SURNILLA ET AL.	
	Examiner	Art Unit	
	Tu M. Nguyen	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1 and 3-20* is/are rejected.

7)☒ Claim(s) 2 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. An Applicant's Amendment filed on March 13, 2007 has been entered. Claims 13 and 20 have been amended. Overall, claims 1-20 are pending in this application.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office Action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 3, 4, 6, 8, 9, and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Boegner et al. (U.S. Patent 6,637,189).

Re claim 1, Boegner et al. disclose a method for controlling an engine coupled to an emission control device (NOx adsorber) susceptible to sulfur contamination, the method comprising:

- deciding whether to reduce sulfur contamination in the device based on at least an operating condition (lines 48-51 of column 3);

- in response to a decision to reduce sulfur contamination: raising temperature of the device by adjusting engine operation (Phase I) (line 57 of column 3 to line 24 of column 4); and

- when said temperature reaches a preselected value, oscillating an air-fuel ratio entering the device between rich and lean to reduce said sulfur contamination (Phase III) (see line 55 of

column 4 to line 15 of column 5), where a peak allowable amplitude of said air-fuel oscillations is determined based on temperature (see lines 14-27 of column 6, claim 2, and especially lines 25-29 of column 4 where Boegner et al. disclose that a desulfurization temperature range must be maintained during Phase III).

Re claim 3, in method of Boegner et al., the controller increases a period of oscillations as an amplitude of oscillations is decreased (lines 3-6 of column 5).

Re claim 4, in method of Boegner et al., the lean and rich oscillation is asymmetric (see line 65 of column 4 to line 6 of column 5).

Re claim 6, in the method of Boegner et al., the lean and rich oscillation is controlled to be symmetric, as clearly shown in Figure 1A during Phase III.

Re claims 8-9, the method of Boegner et al. further comprises adjusting a period of oscillations based on operating conditions, wherein the operating conditions include at least one of temperature of the device and exhaust gas temperature.

Re claim 12, in the method of Boegner et al., the raising temperature of the device by adjusting engine operation includes retarding ignition timing (lines 8-15 of column 2).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boegner et al. as applied to claim 4 above, in view of legal precedent.

The method of Boegner et al. discloses the invention as cited above, however, fails to disclose that a time integral of the lean oscillation is controlled to be equal to a time integral of the rich oscillation.

Boegner et al. disclose the claimed invention except for specifying that a time integral of the lean oscillation is equal to a time integral of the rich oscillation. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum value of the time integral of the lean oscillation, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). This is especially true when Boegner et al. disclose that a frequency and interval of a rich or lean modulation are set variably to maintain the NOx adsorber temperature within a predetermined desulfurization range.

6. Claims 7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boegner et al. as applied to claim 1 above, in view of Hepburn et al. (U.S. Patent 6,199,373).

Re claim 7, the method of Boegner et al. discloses the invention as cited above, however, fails to disclose that the controller adjusts an amplitude of the air-fuel oscillations based on an oxygen storage amount of an upstream emission control device.

As shown in Figure 1, Hepburn et al. disclose an apparatus for desulfating a NOx trap (32) having an upstream TWC (26). The TWC is located closer to the engine, where it is effective to purify harmful emissions during an engine start-up. As depicted in Figure 3 and indicated on line 55 of column 3 to line 12 of column 4, when the NOx trap is to be desulfated,

Hepburn et al. teach that it is conventional in the art to adjust an amplitude of an air-fuel oscillations based on an oxygen storage amount of the TWC so that a lean or rich breakthrough across the TWC can be achieved for desulfating the NOx trap. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the TWC and the teaching taught by Hepburn et al. in the method of Boegner et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to effectively remove SOx from the NOx adsorber.

Re claim 10, in the modified method of Boegner et al., the raising temperature of the device by adjusting engine operation includes exhaust air-fuel ratio between lean and rich to generate heat in an upstream device ((26) in Hepburn et al.) having oxygen storage capacity.

7. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boegner et al. as applied to claim 1 above, in view of Takahashi et al. (U.S. Patent 6,237,330).

The method of Boegner et al. discloses the invention as cited above, however, fails to disclose that the raising temperature of the device by adjusting engine operation includes operating a first group of cylinder lean and a second group of cylinders rich, with the rich and lean exhaust gas mixing to generate exothermic heat.

As shown in Figure 1, Takahashi et al. disclose an exhaust purification device for an internal combustion engine, comprising a rear catalyst (23) susceptible to sulfur contamination. As indicated in the Abstract, when the rear catalyst is to be desulfated, Takahashi et al. teach that it is conventional in the art to raise temperature of the rear catalyst by adjusting engine operation including operating a first group of cylinder lean and a second group of cylinders rich, with the rich and lean exhaust gas mixing to generate exothermic heat at the catalyst. It

would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Takahashi et al. in the method of Boegner et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to effectively remove SOx from the NOx adsorber.

8. Claims 13-15, 17, and 20 rejected under 35 U.S.C. 103(a) as being unpatentable over Boegner et al. in view of Mamiya et al. (U.S. Patent 5,462,039).

Re claims 13 and 20, Boegner et al. disclose a system and a computer storage medium having instructions encoded therein for controlling an engine, the system comprising:

- a first emission control device (SOx trap (line 22 of column 1)) coupled to the engine;

- a second emission control device (NOx adsorber) coupled to the engine, the second device susceptible to sulfur contamination and located downstream of the first device; and

- a controller (not shown but inherently must have) for deciding whether to reduce sulfur contamination in the second device based on at least an operating condition (lines 48-51 of column 3); in response to a decision to reduce sulfur contamination: raising temperature of the device by adjusting engine operation (Phase I) (line 57 of column 3 to line 24 of column 4); and when the temperature reaches a preselected value, oscillating an air-fuel ratio entering the second device between rich and lean to reduce the sulfur contamination (Phase III) (see line 55 of column 4 to line 15 of column 5), where an amplitude of the air-fuel oscillations is determined based on an exhaust temperature (see lines 14-27 of column 6, claim 2, and especially lines 25-29 of column 4 where Boegner et al. disclose that a desulfurization temperature range must be maintained during Phase III).

Boegner et al., however, fail to disclose that the amplitude decreases as temperature increases.

As shown in Figure 2, Mamiya et al. disclose an air-fuel ratio control system for internal combustion engine to raise a temperature of a catalytic converter (11) to an activation level to purify harmful emissions in an exhaust gas stream. As depicted in Figure 4 and indicated in the Abstract, Mamiya et al. teach that it is conventional in the art to oscillate an engine air-fuel ratio between rich and lean to raise the temperature of the catalytic converter; and that an amplitude of the oscillations is decreased as the temperature increases gradually to the activation level. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Mamiya et al. in the system and storage medium of Boegner et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to increase a purification efficiency by effectively raising and converging a catalytic converter temperature to a desired activation level.

Re claim 14, in the modified system of Boegner et al., the controller increases a period of oscillations as an amplitude of oscillations is decreased, as shown in Figure 6 of Mamiya et al.

Re claim 15, in the modified system of Boegner et al., the lean and rich oscillation is asymmetric (see line 65 of column 4 to line 6 of column 5).

Re claim 17, in the modified system of Boegner et al., the lean and rich oscillation is controlled to be symmetric, as shown in Figure 6 of Mamiya et al.

9. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boegner et al. in view of Mamiya et al. as applied to claim 15 above, and further in view of legal precedent.

The modified system of Boegner et al. discloses the invention as cited above, however, fails to disclose that a time integral of the lean oscillation is controlled to be equal to a time integral of the rich oscillation.

Boegner et al. disclose the claimed invention except for specifying that a time integral of the lean oscillation is equal to a time integral of the rich oscillation. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum value of the time integral of the lean oscillation, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). This is especially true when Boegner et al. disclose that a frequency and interval of a rich or lean modulation are set variably to maintain the NOx adsorber temperature within a predetermined desulfurization range.

10. Claim 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boegner et al. in view Mamiya et al. of as applied to claim 15 above, and further in view of Hepburn et al. (U.S. Patent 6,199,373).

Re claim 18, the modified system of Boegner et al. discloses the invention as cited above, however, fails to disclose that the controller adjusts an amplitude of the air-fuel oscillations based on an oxygen storage amount of an upstream emission control device.

As shown in Figure 1, Hepburn et al. disclose an apparatus for desulfating a NOx trap (32) having an upstream TWC (26). The TWC is located closer to the engine, where it is effective to purify harmful emissions during an engine start-up. As depicted in Figure 3 and indicated on line 55 of column 3 to line 12 of column 4, when the NOx trap is to be desulfated, Hepburn et al. teach that it is conventional in the art to adjust an amplitude of an air-fuel oscillations based on an oxygen storage amount of the TWC so that a lean or rich breakthrough across the TWC can be achieved for desulfating the NOx trap. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the TWC and the teaching taught by Hepburn et al. in the modified system of Boegner et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to effectively remove SOx from the NOx adsorber.

Re claim 19, in the modified system of Boegner et al., the controller further adjusts a period of oscillations based on operating conditions (in Mamiya et al., a period of oscillations is longer as a temperature of the catalytic converter as modeled from a coolant temperature is increased).

Allowable Subject Matter

11. Claim 2 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

12. Applicant's arguments with respect to the references applied in the previous Office Action have been fully considered but they are not persuasive.

Re claim 1, in response to applicant's argument that Boegner et al. fail to disclose or suggest that "a peak allowable amplitude of said air-fuel oscillations is determined based on temperature (of the device)" (pages 8-9 of the Applicant's Amendment), the examiner respectfully disagrees.

As indicated on lines 14-27 of column 6, Boegner et al. disclose that a peak allowable amplitude of the air-fuel oscillations is set as a function of the operating state of the system. The operating state of the system in Boegner et al. includes a temperature of the emission control device (NOx adsorber) because as indicated on lines 25-29 of column 4, a relatively high temperature of the NOx adsorber must be maintained in order for the SOx to be released from the NOx adsorber. Thus, Boegner et al. clearly disclose the claimed limitation in dispute.

Re claim 1, in response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., an amplitude of the oscillations is adjusted based on a temperature (of the device)) (emphasis added by examiner) are not recited in the rejected claim. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office Action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Prior Art

14. The IDS (PTO-1449) filed on December 2, 2003 has not been considered because the PTO record for this IDS does not include a listing of the references. Applicant is requested to include a substitute IDS in response to this Office Action.

Communication

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tu M. Nguyen

TMN

May 28, 2007

Tu M. Nguyen

Primary Examiner

Art Unit 3748